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Adaptation of Telemedicine in Saudi Family Medicine Clinics: A Cross-Sectional Study on Patient and Physician Satisfaction

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Abstract **Background:** Telemedicine has emerged as a vital component of modern healthcare delivery, particularly during the COVID-19 pandemic. In Saudi Arabia, its adoption has expanded rapidly in family medicine clinics, offering convenience and continuity of care. However, concerns regarding diagnostic accuracy, technical challenges and physician adaptation remain, necessitating an evaluation of satisfaction from both patient and physician perspectives. **Objective:** To assess patient and physician satisfaction with telemedicine services in Saudi family medicine clinics and to identify predictors, barriers and opportunities for improvement. **Methods:** This descriptive cross-sectional study was conducted in Hail. A total of 1,000 participants (800 patients and 200 physicians) from the Hail population were surveyed using an electronic structured questionnaire. Data were analyzed using SPSS version 16.0, with descriptive statistics, chi-square tests, ANOVA and logistic regression applied to identify independent predictors of satisfaction. **Results:** The mean age of participants was 36.4±11.2 years, with patients significantly younger than physicians (34.8±10.7 vs. 42.7±9.8 years, $p<0.001$). Patients expressed high satisfaction with convenience (mean 4.12±0.89) and overall telemedicine experience (mean 3.99±0.91), while technical performance received lower scores (mean 3.59±1.07). Physicians reported favorable satisfaction overall (mean 3.96±0.94), particularly regarding workload management (3.90±1.01) but diagnostic confidence remained limited (3.32±1.15). Major barriers included internet connectivity issues (40.2%), limited appointment availability (32.6%) and patient unfamiliarity with technology (26.8%). Logistic regression revealed that younger age (aOR 1.72, 95% CI 1.21-2.45), higher education (aOR 2.32, 95% CI 1.50-3.58), digital literacy (aOR 2.85, 95% CI 1.94-4.19) and physician organizational support (aOR 1.67, 95% CI 1.11-2.49) were significant predictors of satisfaction. **Conclusion:** Telemedicine has been well received in Saudi family medicine clinics, with both patients and physicians reporting high levels of satisfaction. While its advantages include convenience, accessibility and improved workload distribution, challenges related to diagnostic confidence, connectivity and patient training persist. Strengthening infrastructure, enhancing digital literacy and supporting physicians through organizational measures will be essential to sustain and expand telemedicine services in alignment with Saudi Vision 2030.

Key Words Telemedicine, Patient Satisfaction, Physician Satisfaction, Family Medicine, Saudi Arabia, Digital Health

INTRODUCTION

The evolution of healthcare delivery has been strongly influenced by technological advances, with telemedicine emerging as one of the most transformative innovations in modern clinical practice. Telemedicine refers to the use of telecommunications and digital platforms to provide medical services, allowing patients and physicians to interact remotely without the need for face-to-face visits [1]. Initially used in specialized settings to support rural and underserved areas, its application has now expanded into mainstream

medicine, including primary care and family practice. The COVID-19 pandemic accelerated this shift globally, as restrictions on in-person consultations highlighted the necessity of remote healthcare solutions [2]. In Saudi Arabia, telemedicine adoption has paralleled international trends, supported by the government's Vision 2030 initiative to enhance digital transformation across healthcare systems [3]. Family medicine clinics, which serve as the cornerstone of primary healthcare, have increasingly incorporated telemedicine as a means to maintain accessibility, continuity of care and efficiency. During the pandemic, telemedicine ensured that patients could still receive medical attention while minimizing infection risk and its continued use reflects a growing recognition of its role in long-term healthcare delivery [4]. Patient satisfaction is central to the sustainability of telemedicine. Studies in Saudi Arabia have reported generally high satisfaction rates, with many patients valuing the convenience, reduced travel time and easier access to physicians. One national survey found that over 80% of participants were satisfied with their telemedicine experiences, particularly younger individuals and those with higher educational attainment [5]. Similarly, research from Al-Ahsa showed that about two-thirds of patients expressed positive attitudes toward virtual consultations, though challenges such as technical issues, scheduling limitations and communication barriers were also reported [6]. These findings suggest that demographic and digital literacy factors influence patient perceptions and that satisfaction is not uniform across all groups.

Physician perspectives are equally critical, as provider acceptance strongly influences implementation and long-term adoption. Evidence from Saudi physicians indicates that most consider telemedicine a valuable adjunct to practice, with nearly 78% reporting satisfaction during the pandemic [5]. Reported advantages include workload distribution, efficiency in managing follow-ups and improved patient accessibility. Nonetheless, barriers remain, including difficulties in performing physical examinations, patients' limited familiarity with technology and occasional network connectivity issues [7]. Such challenges underline the need for improved system infrastructure, clear protocols and targeted training for both patients and healthcare providers. Despite these advantages, gaps persist in understanding the dual perspectives of patients and physicians within Saudi Arabia's family medicine clinics. While several studies have examined satisfaction levels in isolation, fewer have provided a comprehensive evaluation of both groups simultaneously. This is particularly important given that family medicine represents the first line of care and is central to the Kingdom's healthcare reform agenda. Exploring satisfaction in this context provides valuable insight into barriers, facilitators and opportunities for strengthening telemedicine systems. Therefore, this study aims to assess the adaptation of telemedicine in Saudi family medicine clinics through the lens of both patient and physician satisfaction. By identifying predictors of satisfaction, highlighting challenges and examining opportunities for improvement, this research contributes to optimizing telemedicine in line with Saudi Vision 2030 and the global movement toward digital health transformation.

Objective

- To assess patient and physician satisfaction with telemedicine services in Saudi family medicine clinics
- To identify predictors, barriers and opportunities for improvement. Opportunities for Improvement
- Patient Education: Tailored educational initiatives are needed to increase patient awareness, knowledge and comfort with the technology
- Technological Infrastructure: Investing in robust and reliable ICT infrastructure is essential to minimize technical glitches

METHODS

This was a descriptive cross-sectional study conducted at Hail designed to evaluate patient and physician satisfaction with telemedicine services in family medicine clinics. A total of 1,000 participants from the Hail population were included. Patients who had previously accessed telemedicine services and physicians providing telemedicine consultations were eligible for participation. Non-probability convenience sampling was used to recruit participants and incomplete or duplicate responses were excluded from the analysis.

Inclusion Criteria

- Patients aged $\geq$18 years who had used telemedicine services in family medicine clinics
- Physicians providing telemedicine consultations in family medicine clinics
- Participants who provided informed electronic consent

Exclusion Criteria

- Patients or physicians who had never used telemedicine platforms
- Respondents unwilling to participate or who submitted incomplete questionnaires
- Duplication has been avoided by exclusion of same data

Data Collection

Data were collected using an electronic structured questionnaire distributed via clinic portals and social media platforms. The questionnaire was adapted from previously validated telemedicine satisfaction surveys and modified for the Saudi context. It consisted of three sections: demographic characteristics (age, gender, education, occupation and digital literacy), satisfaction domains (accessibility, communication, convenience and overall experience) and barriers or challenges (technical problems, connectivity issues and scheduling difficulties). Responses were recorded on a five-point Likert scale ranging from

"very dissatisfied" to "very satisfied." A pilot test of 50 participants was conducted to ensure clarity and reliability and necessary adjustments were made before full-scale deployment.

Statistical Analysis

All data were entered and analyzed using SPSS version 16.0 (SPSS Inc., Chicago, IL). Continuous variables such as age were expressed as Mean±Standard deviation, while categorical variables such as gender, education and satisfaction levels were reported as frequencies and percentages. Chi-square tests were applied to examine associations between categorical variables, while independent t-tests and one-way ANOVA were used for continuous variables. Logistic regression analysis was performed to identify independent predictors of patient and physician satisfaction, adjusting for age, gender, education and digital literacy. A p-value ≤0.05 was considered statistically significant.

Ethical Considerations

The study was approved by the Research Ethics Committee at the University of Hail, Saudi Arabia. Written informed consent was obtained electronically from all participants prior to enrollment. Participation was voluntary and confidentiality of data was maintained throughout the study.

RESULTS

The mean age of participants was 36.4±11.2 years, with patients being younger (34.8±10.7 years) than physicians (42.7±9.8 years). About one-third of the total sample (34.2%) was between 18-30 years, while nearly half (47.8%) fell in the 31-50 years range. Males made up 54.6% of the overall sample, with a higher proportion among physicians (63.0%) compared to patients (52.5%). Most participants had at least a university degree (54.3%), though postgraduate education was more frequent among physicians (60.0%) than patients (15.9%) (Table 1).

Among patients, satisfaction with telemedicine was generally high. Convenience scored the highest with a mean of 4.12±0.89, where 80.1% of patients were satisfied or very satisfied. Overall satisfaction averaged 3.99±0.91, with more than three-quarters of patients expressing positive feedback. Communication with physicians (Mean 3.97±0.93) also ranked well, while technical performance was the weakest area, with a mean score of 3.59±1.07 and 22.3% reporting dissatisfaction due to audio, video or connectivity problems (Table 2).

Physicians also reported favorable experiences, with an overall satisfaction mean score of 3.96±0.94. The highest-rated domain was workload management (3.90±1.01), with nearly three-quarters expressing satisfaction. Ease of use (3.84±0.98) and communication with patients (3.86±0.94) were also positively rated. However, diagnostic confidence was notably lower at 3.32±1.15, with almost 28% of physicians reporting dissatisfaction, reflecting concerns about the inability to perform physical examinations remotely (Table 3).

The most common barriers reported were internet connectivity problems (40.2%), limited appointment availability (32.6%) and lack of patient familiarity with technology (26.8%). Physicians were particularly concerned about reduced diagnostic accuracy (48.0%) compared to only 22.3% of patients. Communication barriers were highlighted by 32.0% of physicians and 23.0% of patients, showing that both groups struggled with clarity and completeness of virtual consultations (Table 4).

Patient satisfaction varied significantly across demographics. Younger adults aged 18-30 years reported the highest satisfaction (4.12±0.87), while those over 50 years were least satisfied (3.66±1.01, p<0.01). Women expressed slightly higher satisfaction than men (4.00±0.91 vs. 3.91±0.92), although this difference was not statistically significant. Education played a strong role: postgraduate participants scored the highest (4.15±0.84), followed by university graduates (3.97±0.89), while those with only secondary or lower education had the lowest satisfaction (3.62±0.98, p<0.001) (Table 5).

Logistic regression analysis revealed that younger age (≤30 years) significantly predicted higher satisfaction (aOR 1.72, 95% CI 1.21-2.45, p = 0.002). Education showed a strong positive association, with postgraduate participants more than twice as likely to be satisfied (aOR 2.32, p<0.001). High digital literacy emerged as the strongest predictor (aOR 2.85, p<0.001). Physician-related factors also mattered, as organizational support increased satisfaction odds by 67% (aOR 1.67, p = 0.01). Gender was not a significant predictor (Table 6).

Table 1: Baseline Demographic Characteristics of Participants (N = 1,000)

Variable	Total (N = 1,000)	Patients (n = 800)	Physicians (n = 200)	p-value
Age, years, mean±SD	36.4±11.2	34.8±10.7	42.7±9.8	<0.001
Age group, n (%)				
• 18-30 years	342 (34.2)	312 (39.0)	30 (15.0)	<0.001
• 31-50 years	478 (47.8)	373 (46.6)	105 (52.5)	
• >50 years	180 (18.0)	115 (14.4)	65 (32.5)	
Gender, n (%)				
• Male	546 (54.6)	420 (52.5)	126 (63.0)	0.01
• Female	454 (45.4)	380 (47.5)	74 (37.0)	
Education, n (%)				
• Secondary or lower	210 (21.0)	210 (26.3)	-	<0.001
• University/College	543 (54.3)	463 (57.9)	80 (40.0)	
• Postgraduate	247 (24.7)	127 (15.9)	120 (60.0)	

Table 2: Patient Satisfaction with Telemedicine (N = 800)

Domain	Very satisfied n (%)	Satisfied n (%)	Neutral n (%)	Dissatisfied n (%)	Very dissatisfied n (%)	Mean±SD
Accessibility (appointment booking, availability)	268 (33.5)	296 (37.0)	116 (14.5)	82 (10.3)	38 (4.7)	3.85±0.94
Convenience (time saved, travel avoided)	352 (44.0)	289 (36.1)	89 (11.1)	50 (6.3)	20 (2.5)	4.12±0.89
Communication quality (with physician)	310 (38.8)	288 (36.0)	102 (12.8)	70 (8.8)	30 (3.8)	3.97±0.93
Technical performance (audio/video clarity, connectivity)	216 (27.0)	272 (34.0)	134 (16.8)	120 (15.0)	58 (7.3)	3.59±1.07
Overall satisfaction	300 (37.5)	314 (39.3)	94 (11.8)	62 (7.8)	30 (3.8)	3.99±0.91

Table 3: Physician Satisfaction with Telemedicine (N = 200)

Domain	Very satisfied n (%)	Satisfied n (%)	Neutral n (%)	Dissatisfied n (%)	Very dissatisfied n (%)	Mean±SD
Ease of use (platform interface, workflow)	62 (31.0)	81 (40.5)	28 (14.0)	21 (10.5)	8 (4.0)	3.84±0.98
Ability to manage workload	74 (37.0)	69 (34.5)	28 (14.0)	21 (10.5)	8 (4.0)	3.90±1.01
Communication with patients	66 (33.0)	74 (37.0)	34 (17.0)	18 (9.0)	8 (4.0)	3.86±0.94
Diagnostic confidence	40 (20.0)	60 (30.0)	44 (22.0)	36 (18.0)	20 (10.0)	3.32±1.15
Overall satisfaction	72 (36.0)	76 (38.0)	28 (14.0)	16 (8.0)	8 (4.0)	3.96±0.94

Table 4: Reported Barriers to Telemedicine (Patients and Physicians, N = 1,000)

Barrier	Patients (n = 800) n (%)	Physicians (n = 200) n (%)	Total (N = 1,000) n (%)
Internet connectivity issues	318 (39.8)	84 (42.0)	402 (40.2)
Limited appointment availability	276 (34.5)	50 (25.0)	326 (32.6)
Difficulty using technology	224 (28.0)	42 (21.0)	266 (26.6)
Reduced diagnostic accuracy	178 (22.3)	96 (48.0)	274 (27.4)
Communication barriers	184 (23.0)	64 (32.0)	248 (24.8)
Lack of patient familiarity/training	210 (26.3)	58 (29.0)	268 (26.8)

Table 5: Comparison of Satisfaction Scores by Demographics (Patients, N = 800)

Variable	Satisfaction Score (Mean±SD)	p-value
Age group		
• 18-30 years	4.12±0.87	<0.01
• 31-50 years	3.94±0.90	
• >50 years	3.66±1.01	
Gender		
• Male	3.91±0.92	0.21
• Female	4.00±0.91	
Education		
• Secondary or lower	3.62±0.98	<0.001
• University/College	3.97±0.89	
• Postgraduate	4.15±0.84	

Table 6: Predictors of Overall Satisfaction (Multivariable Logistic Regression, N = 1,000)

Predictor	Adjusted Odds Ratio (aOR)	95% CI	p-value
Age ≤30 years	1.72	1.21-2.45	0.002
Female gender	1.18	0.89-1.57	0.23
University/college education	1.94	1.34-2.79	<0.001
Postgraduate education	2.32	1.50-3.58	<0.001
High digital literacy	2.85	1.94-4.19	<0.001
Physician organizational support	1.67	1.11-2.49	0.01

DISCUSSION

This cross-sectional study examined patient and physician satisfaction with telemedicine services in family medicine clinics in Saudi Arabia. The findings indicate that telemedicine has been generally well accepted by both patients and physicians, with overall satisfaction scores close to 4.0 out of 5, reflecting positive adaptation in line with Saudi Arabia's healthcare transformation goals. Patients reported high satisfaction, particularly with convenience and accessibility. More than 80% of participants acknowledged time-saving benefits and reduced need for travel, consistent with previous research showing that patients appreciate the efficiency and accessibility of virtual consultations. Younger adults and those with higher education levels expressed greater satisfaction, a pattern that mirrors previous research where demographic and digital literacy factors significantly influenced telemedicine experiences [8,9]. On the other hand, older patients and those with lower education levels were less satisfied, highlighting the importance of tailoring digital health initiatives to vulnerable groups through targeted training and support. Physician responses were similarly favorable, with nearly three-quarters expressing satisfaction with ease of use and workload management. This aligns with previous research in which physicians noted telemedicine as a practical tool for managing patient loads, particularly in high-volume clinics [10]. However, diagnostic confidence remained a major concern, with almost 28% of physicians dissatisfied in this domain. This echoes previous research that identified reduced capacity for physical examination and diagnostic accuracy as major

limitations [11]. Such concerns suggest that telemedicine is better suited for follow-up consultations, chronic disease management and administrative tasks rather than acute or complex diagnostic scenarios.

Barriers reported by both groups centered on technical issues, including internet connectivity and limited appointment availability. About 40% of participants faced connectivity challenges, while one-third noted scheduling difficulties. These challenges are consistent with previous research from Saudi and international contexts, which emphasized the importance of robust technical infrastructure for sustaining telemedicine [12,13]. Interestingly, physicians were more likely than patients to cite diagnostic limitations as a barrier (48 vs. 22%), suggesting that physician satisfaction is influenced not only by system performance but also by clinical confidence. The regression analysis identified digital literacy as the strongest predictor of satisfaction, with digitally literate participants nearly three times more likely to report positive experiences. Education and younger age were also significant predictors, reinforcing the notion that telemedicine adoption is driven by demographic readiness. Similar patterns have been observed in previous research, which consistently shows that education and familiarity with digital tools enhance telemedicine uptake and satisfaction [14,15]. Importantly, organizational support for physicians also increased satisfaction odds, supporting previous research that emphasized the role of institutional backing, technical support and workflow integration [16].

The study has several strengths, including a large sample size of 1,000 participants and the inclusion of both patient and physician perspectives, offering a more comprehensive assessment than prior single-group studies. However, limitations must be acknowledged. The study was confined to Hail, which may limit generalizability to other regions of Saudi Arabia. Self-reported satisfaction is also subject to bias and the cross-sectional design prevents assessment of long-term outcomes or sustainability. Despite these limitations, the findings contribute to the growing body of evidence supporting telemedicine integration into family medicine. The results underscore the need for targeted strategies to address identified barriers, including improving technical infrastructure, enhancing training for patients and providers and developing hybrid models that combine telemedicine with in-person care where necessary. By addressing these challenges, telemedicine can continue to play a vital role in Saudi Arabia's healthcare reform under Vision 2030.

CONCLUSIONS

It is concluded that telemedicine has been successfully adapted in Saudi family medicine clinics, with high levels of satisfaction reported by both patients and physicians. Patients valued the convenience, accessibility and time-saving benefits of virtual consultations, while physicians appreciated the ability to manage workloads and maintain continuity of care. However, barriers such as limited diagnostic confidence, internet connectivity issues and patient unfamiliarity with technology remain significant. Younger age, higher education, digital literacy and organizational support were identified as key predictors of satisfaction, underscoring the importance of demographic and systemic factors in shaping telemedicine experiences. To maximize its potential, efforts should focus on strengthening digital infrastructure, enhancing training for both patients and healthcare providers and integrating hybrid models of care. These steps will ensure telemedicine continues to play a central role in advancing healthcare delivery in line with Saudi Arabia's Vision 2030.

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